Geomorphological Monitoring of a Sediment Injection Experimentation: the Old Rhine between Kembs and Breisach dams (France, Germany)

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A sediments injection test has been realized within the river Rhine in the frame of the French and German INTERREG project 'Revitalisation of the Old Rhine'. The project aims at establishing sediment transport restoration modalities and recreating a variety of ecological habitats that feeds the reach biodiversity. 22,000 m3 of sediments have been injected in late 2010 within the by-passed 45 km reach between Kembs and Breisach, forming a 600 m long deposit disconnected from the bank.

A geomorphological survey of the deposit has been done to study the mass spreading and river transport capacity. Geomorphological monitoring of recharge, before and after flood is based on 4 types of measures:

• monitoring radio frequency of 1500 tracer pebbles inserted into the surface of the deposit: the trajectories of movement were analyzed using the particle size and initial position;

• grain size monitoring: immersed and emerged samples allow to characterize injected sediment -nearby excavated for retention area purposes without any sorting- and to learn about the sorting effect of the recharge spreading;

• topographic and bathymetric monitoring: it is used to determine changes in channel geometry by comparison of cross sections;

• surveys by very high spatial aerial imagery using an ultra light aircraft: bathymetric models calibrated with field surveys are generated to track the front of the wave dispersion and morphological changes of the bed in the study area.

These complementary measures confirmed the estimates according to experts of transport capacity (20,000 m3/year), spread the risk of revegetation of the initial deposit, and allow calibration of hydraulic sedimentary and physical models. Three after flood states and initial conditions are analyzed in this study featured by the largest number of tracers used in a river restoration experiment as well as the amount of aerial data (multi temporal and multi resolution).

In a second step, measures will feed scenarios of recommendations for a sustainable sediment dynamics restoration. The injection test provides concrete elements for construction of scenarios of evolution, and for guiding future restoration strategies to diversify aquatic and riparian habitats of the Old Rhine. Moreover equivalent injections performed soon by the local hydroelectric manager (Electricité De France) have already the feedback of this life test.